SAMSUNG

ELECTRONICS

Approval

TO   : Lenovo
DATE   : Nov, 13, 2009

SAMSUNG TFT-LCD

MODEL NO. : LTN140AT07-K02

NOTE : Extension code [-K02]
                → LTN140AT07-K02
           - Surface type [**Glare**]

Any Modification of Specification is not allowed without SEC's Permission.

APPROVED BY :   *Manki - Lee*

PREPARED BY : **LCD Customer Satisfaction Part , TCS Team**

SAMSUNG ELECTRONICS CO., LTD.

wise view™

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Doc.No.	LTN140AT07-K02	Rev.No	04-A01-G-091111	Page	1 / 30

Approval

CONTENTS

Doc.No.	LTN140AT07-K02	**Rev.No**	04-A01-G-091111	**Page**	2 / 30

REVISION HISTORY

Approval

Date	Rev. No.	Page	Summary
Dec. 26. 2008	P00	All	. The preliminary specification was first issued.
Jan.14.2009	P01	- 12 19	. Model name was fixed. -Back light unit was updated - Interface Timing was updated
March.10.2009	P02	22 28	. Outline was updated. . EDID was updated
March.24.2009	P03	22	. Outline was updated. (The position of label was changed)
July.10. 2009	P04	28~30	. EDID was updated
July.28.2009	P05	12 23-25	. Back light unit was updated. . Packing was updated.
Aug.17.2009	P06	24	- Product Label Definition was updated.
Oct. 29 . 2009	A00	22	. Outline was updated. (Add 4pcs sponge position & Max thickness 5.2 → 5.4)
Nov. 11 . 2009	A01	1,4,24, 25,28, 29,30	. Module code changed. EDID data was changed.

Samsung Secret

Doc.No.	LTN140AT07-K02	Rev.No	04-A01-G-091111	Page	3 / 30

Approval

GENERAL DESCRIPTION

DESCRIPTION

LTN140AT07-K02 is a color active matrix TFT (Thin Film Transistor) liquid crystal display (LCD) that uses amorphous silicon TFT as a switching devices. This model is composed of a TFT LCD panel, a driver circuit and a backlight unit. The resolution of a 14.0" contains 1,366 x 768 pixels and can display up to 262,144 colors. 6 O'clock direction is the Optimum viewing angle.

FEATURES

- High contrast ratio, high aperture structure
- 1366 x 768 pixels resolution
- Low power consumption
- Fast Response
- LED BLU with LED driver
- 60% Color Gamut
- DE(Data enable) only mode
- 3.3V LVDS Interface
- Onboard EEDID chip
- Pb-free product

APPLICATIONS

- Notebook PC
- If the usage of this product is not for PC application, but for others, please contact SEC.

GENERAL INFORMATION

Item	Specification	Unit	Note
Display area	309.4(H) x 173.95(V) (14.0" diagonal)	mm	
Driver element	a-Si TFT active matrix		
Display colors	262,144		
Number of pixel	1366 x RGB(3) x 768	pixel	16 : 9
Pixel arrangement	RGB vertical stripe		
Pixel pitch	0.2265(H) x 0.2265(V) (TYP.)	mm	
Display Mode	Normally white		
Surface treatment	Haze 0, Hard-Coating 3H		

Doc.No.	LTN140AT07-K02	Rev.No	04-A01-G-091111	Page	4 / 30

Mechanical Information

Approval

Item		Min.	Typ.	Max.	Unit	Note
Module size	Horizontal (H)	323.0	323.5	324	mm	
	Vertical (V)	191.5	192.0	192.5	mm	
	Depth (D)	-	-	5.4	mm	
Weight		-		350	g	

1. ABSOLUTE MAXIMUM RATINGS

1.1 ENVIRONMENTAL ABSOLUTE RATINGS

Item	Symbol	Min.	Max.	Unit	Note
Storage temperate	TSTG	-20	60	°C	(1)
Operating temperate (Temperature of glass surface)	TOPR	0	50	°C	(1)
Shock (non-operating)	Snop	-	240	G	(2),(4)
Vibration (non-operating)	Vnop	-	2.41	G	(3),(4)

Note (1) Temperature and relative humidity range are shown in the figure below.
95 % RH Max. (40 °C $\geq$ Ta)
Maximum wet - bulb temperature at 39 °C or less. (Ta > 40 °C) No condensation

Relative Humidity (%RH)
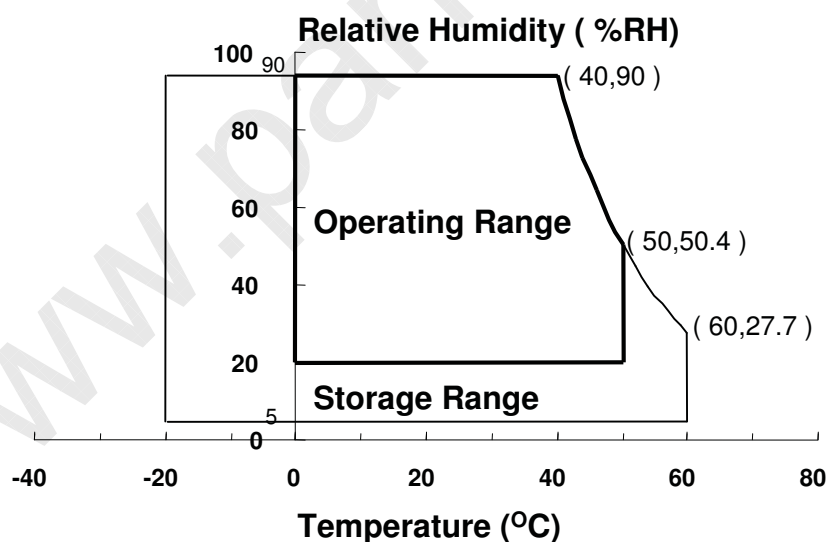
(2) 2ms, half sine wave, one time for ±X, ±Y, ± Z.
(3) 5 - 500 Hz, random vibration, 30min for X, Y, Z.
(4) At testing Vibration and Shock, the fixture in holding the Module to be tested have to be hard and rigid enough so that the Module would not be twisted or bent by the fixture.

Samsung Secret

Doc.No.	LTN140AT07-K02	Rev.No	04-A01-G-091111	Page	5 / 30

Approval

1.2 ELECTRICAL ABSOLUTE RATINGS

(1) TFT LCD MODULE

V_{DD} =3.3V, V_{SS} = GND = 0V

Item	Symbol	Min.	Max.	Unit	Note
Power Supply Voltage	V_{DD}	VSS - 0.3	3.6	V	(1)

Note (1) Within Ta (25 ± 2 ℃)

| **Doc.No.** | LTN140AT07-K02 | **Rev.No** | 04-A01-G-091111 | **Page** | 6 / 30 |

Approval

2. OPTICAL CHARACTERISTICS

The following items are measured under stable conditions. The optical characteristics should be measured in a dark room or equivalent state with the methods shown in Note (5). Measuring equipment : TOPCON BM-5A and PR-650
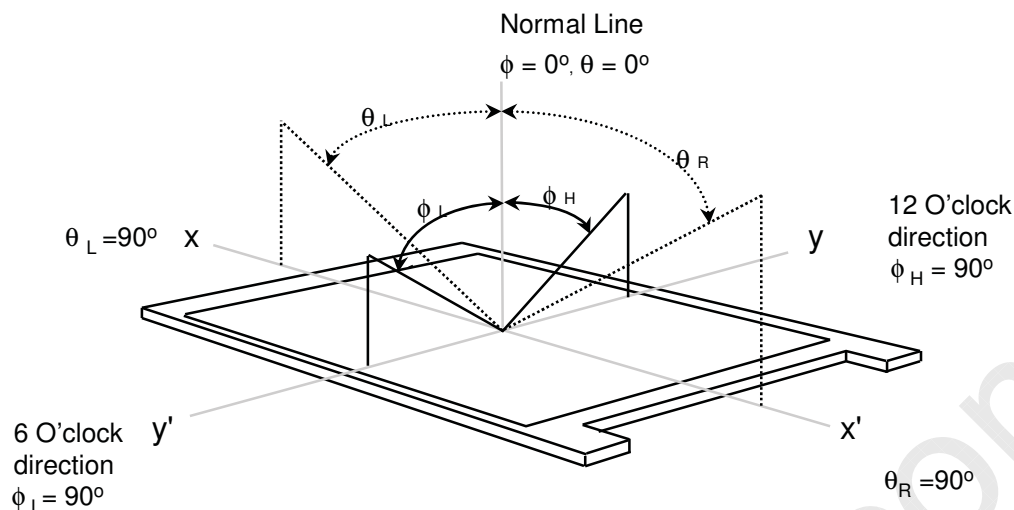
* Ta = 25 ± 2 °C, V_{DD}=3.3V, fv= 60Hz, f_{DCLK} = 72.33MHz, I_L = 20 mArms

Item		Symbol	Condition	Min.	Typ.	Max	Unit	Note
Contrast Ratio (5 Points)		CR		-	500	-	-	(1), (2), (5)
Response Time at Ta (Rising + Falling)		$T_{RT\_B/W}$		-	16	25	msec	(1), (3)
Average Luminance of White (5 Points)		$Y_{L,AVE}$		190	220	-	cd/m²	I_L=20mA (1), (4)
Color Chromaticity (CIE)	Red	R_X	Normal Viewing Angle ϕ = 0 θ = 0	0.580	0.610	0.640	-	(1), (5) PR-650
		R_Y		0.310	0.340	0.370		
	Green	G_X		0.305	0.335	0.365		
		G_Y		0.560	0.590	0.620		
	Blue	B_X		0.120	0.150	0.180		
		B_Y		0.055	0.085	0.115		
	White	W_X		0.283	0.313	0.343		
		W_Y		0.299	0.329	0.359		
Color Gamut				-	60	-	%	
Viewing Angle	Hor.	θ_L	CR ≥ 10	40	-	-	Degrees	(1), (5) BM-5A
		θ_R		40	-	-		
	Ver.	ϕ_H		15	-	-		
		ϕ_L		30	-	-		
13 Points White Variation		δ_L		-	-	1.7	-	(6)

Samsung Secret

Doc.No.	LTN140AT07-K02	Rev.No	04-A01-G-091111	Page	7 / 30

Note 1) Definition of Viewing Angle : Viewing angle range(10 ≤ C/R, 100 ≤ C/R)

Approval

Normal Line
$\phi = 0^o, \theta = 0^o$

θ_L

θ_R

ϕ_L ϕ_H

$\theta_L = 90^o$ x   y

12 O'clock direction
$\phi_H = 90^o$

6 O'clock direction y'
$\phi_L = 90^o$

x'

$\theta_R = 90^o$

Note 2) Definition of Contrast Ratio (CR) : Ratio of gray max (Gmax) ,gray min (Gmin) at 5 points(4, 5, 7, 9, 10)

$$CR = \frac{CR(4) + CR(5) + CR(7) + CR(9) + CR(10)}{5}$$

Points : ④ , ⑤ , ⑦ , ⑨ , ⑩ at the figure of Note (6).

Note 3) Definition of Response time :

Display data White(TFT OFF) Black(TFT ON) White(TFT OFF)

T_R T_F

100%
90%

Optical Response

10%
0%

Time
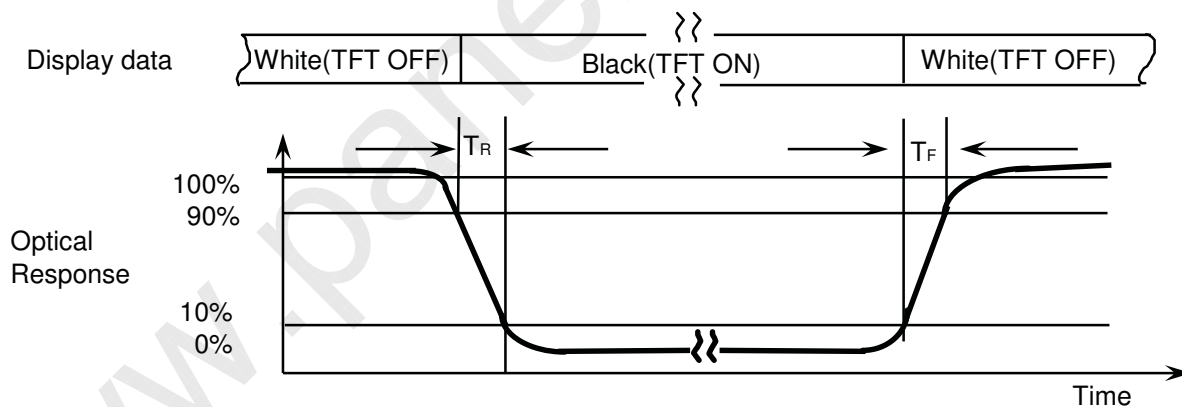
Note 4) Definition of Average Luminance of White : measure the luminance of white at 5 points.

(320) (640) (960)

VIEW AREA

Average Luminance of White ($Y_{L,AVE}$)

⑩ ⑨ (200)

⑦ (400)

$$Y_{L,AVE} = \frac{Y_{L4} + Y_{L5} + Y_{L7} + Y_{L9} + Y_{L10}}{5}$$

⑤ ④ (600)
(lines)

◯ : test point
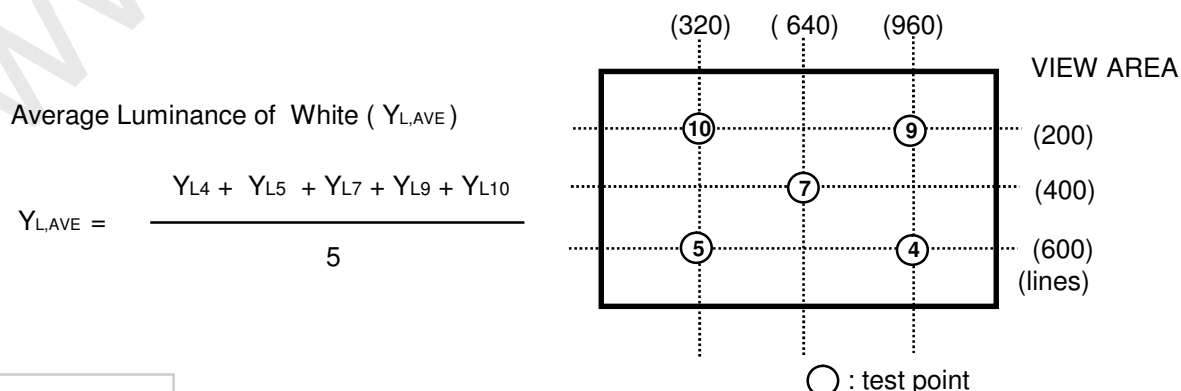
Doc.No.	LTN140AT07-K02	Rev.No	04-A01-G-091111	Page	8 / 30

Approval

Note 5) After stabilizing and leaving the panel alone at a given temperature for 30 min , the measurement
should be executed. Measurement should be executed in a stable, windless,and dark room.
30 min after lighting the backlight. This should be measured in the center of screen.
Environment condition : Ta = 25 ± 2 °C

Photo-detector
(TOPCON BM-5A
PR-650)

Field = 2°

50 cm

TFT-LCD module

LCD panel

Center of the screen

[Optical characteristics measurement setup]
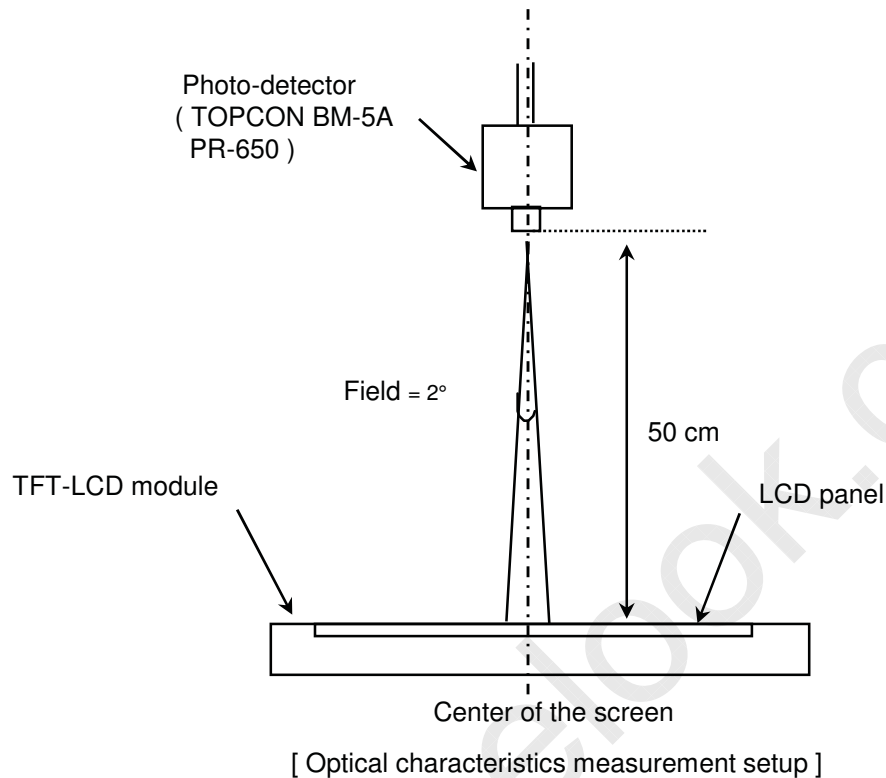
Note 6) Definition of 13 points white variation (δ L), CR variation(CVER) [① ~ ⑬]

$$\delta_L \ = \ \frac{\text{Maximum luminance of 13 points}}{\text{Minimum luminance of 13 points}}$$

10mm

10mm

342　　　683　　　1025

10mm

13　　　　12　　　　11

10

9

192

8　　　　7　　　　6

384　　⃝　　: test point

5　　　　4

576
(lines)

3　　　　2　　　　1

10mm
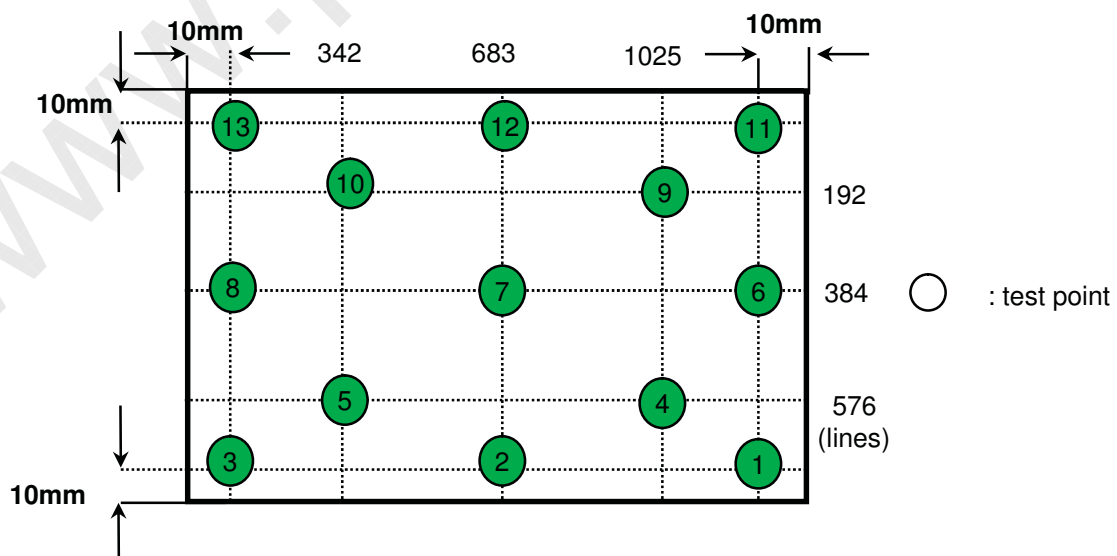
| **Doc.No.** | LTN140AT07-K02 | **Rev.No** | 04-A01-G-091111 | **Page** | 9　/ 30 |

3. ELECTRICAL CHARACTERISTICS

Approval

3.1 TFT LCD MODULE

Ta= 25 ± 2°C

Item		Symbol	Min.	Typ.	Max.	Unit	Note
Voltage of Power Supply		V_{DD}	3.0	3.3	3.6	V	
Differential Input Voltage for LVDS Receiver Threshold	High	V_{IH}	-	-	+100	mV	V_{CM} = +1.2V
	Low	V_{IL}	-100	-	-	mV	
Vsync Frequency		fv	-	60	-	Hz	
Hsync Frequency		f_H	-	47.4	-	KHz	fv*790
Main Frequency		f_{DCLK}	-	72.33	-	MHz	fh*1526
Rush Current		I_{RUSH}	-	-	1.5	A	(4)
Current of Power Supply	White	I_{DD}	-	300	-	mA	(2),(3)*a
	Mosaic		-	350	-	mA	(2),(3)*b
	V. stripe		-	450	485	mA	(2),(3)*c

Note (1) Display data pins and timing signal pins should be connected.(GND = 0V)

(2) fv = 60Hz, f_{DCLK} = 72.33MHZ, V_{DD} = 3.3V , DC Current.

(3) Power dissipation pattern

*a) White Pattern   *b) Mosaic Pattern

VIEW AREA

Display Brightest Gray Level

Display Darkest Gray Level
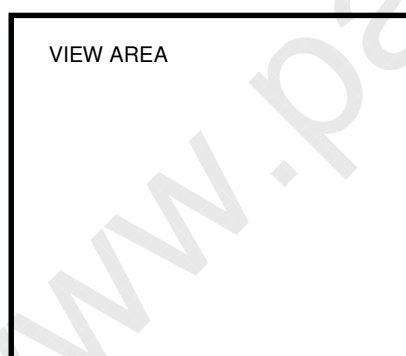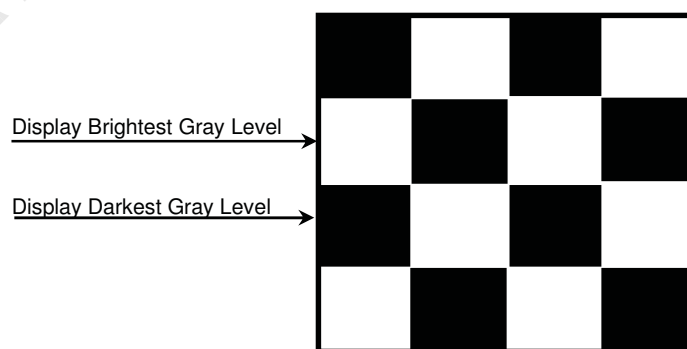
Samsung Secret

Doc.No.	LTN140AT07-K02	Rev.No	04-A01-G-091111	Page	10 / 30

Approval

*c) 1dot Vertical stripe pattern

R	G	B	R	G	B	R	G	B	R	G
R	G	B	R	G	B	R	G	B	R	G
R	G	B	R	G	B	R	G	B	R	G
R	G	B	R	G	B	R	G	B	R	G
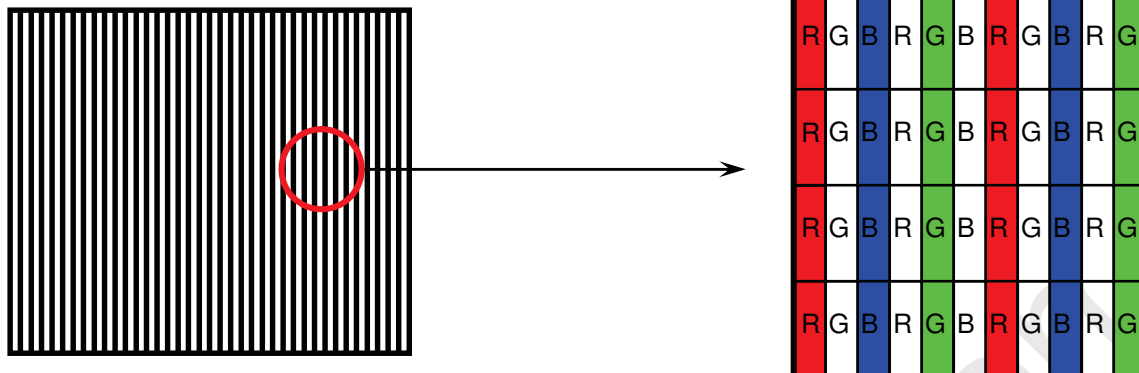
4) Rush current measurement condition

3.3V

M1
2SK1059

FUSE

V_{DD} (LCD INPUT)

R1
47K

C1
1uF

CONTROL SIGNAL
(HIGH to LOW)

R2
1K

M2
2SK1399

12V

R3
47K

C2
10000pF

C3
1uF

V_{DD} rising time is 470us

0.9V_{DD} 3.3V

0.1V_{DD}

GND
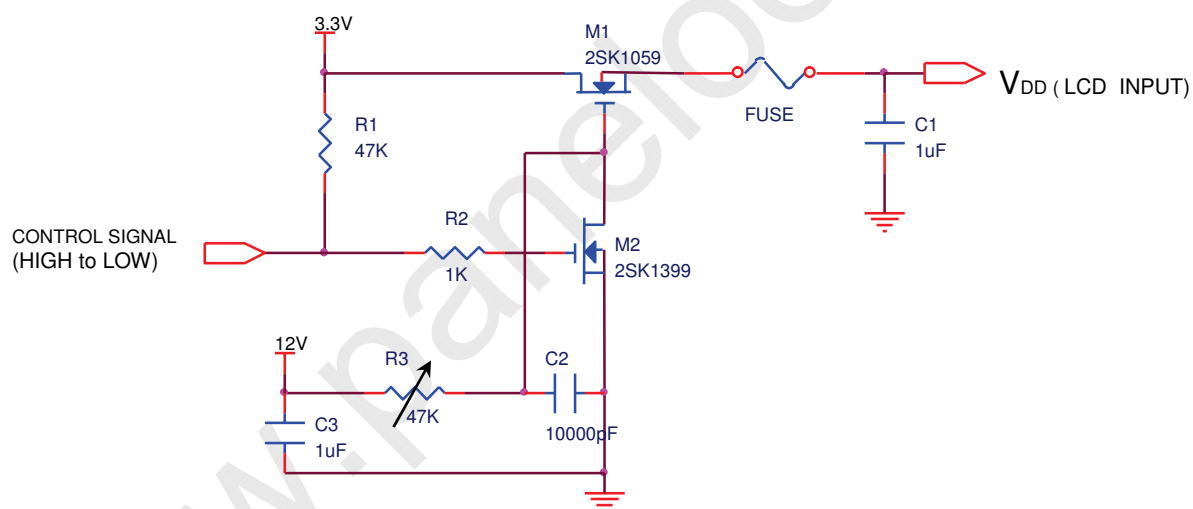
470us
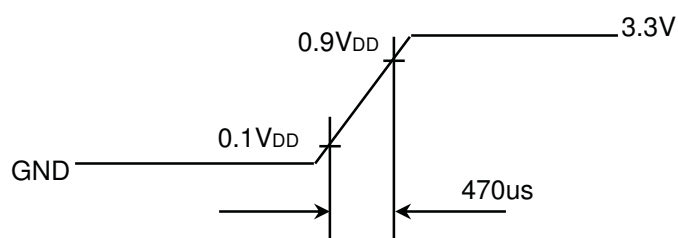
Samsung Secret

| Doc.No. | LTN140AT07-K02 | Rev.No | 04-A01-G-091111 | Page | 11 / 30 |

Approval

3.2 Back light unit

- LED Driver   Ta= 25 ± 2 °C

Item	Symbol	Min.	Typ.	Max.	Unit	Note
Input Voltage	V_{in}	7	12	21	V	
PWM Duty	P_D	5%	-	100	&	(2)
Operating Frequency	F_o	100		2000	Hz	(1),(2)

Note (1) 50μs minimum BRT on-time limits
(2) If PWM Dimming is min 5%, PWM Freq. is Max 1000Hz

- LED Driver Manufacturer : RICHTEK , LED qty.:7 X 6 = 42 EA

Item	Symbol	Min.	Typ.	Max.	Unit	Note
LED Forward Current	IF	-	20	-	mA	
LED Forward Voltage	VF	3	3.2	3.4	V	IF=20mA
LED Array Voltage	VP	21	22.4	23.8	V	VF X 7 LEDs
Power Consumption	P	3.02	3.23	3.43	W	IF X VF X 42LEDs X1.2 IF=20mA (W/ LED driver)
Operating Life Time	Hr	10,000	-	-	Hr	(1)

Note (1) Life time (Hr) of LEDs can be defined as the time in which it continues to operate under the condition Ta= 25 ± 2 °C and DC = 20.0 mA until one of the following event occurs.
- When the brightness becomes 50% or lower than the original.

Samsung Secret

Doc.No.	LTN140AT07-K02	Rev.No	04-A01-G-091111	Page	12 / 30

Approval

4. BLOCK DIAGRAM

4.1 TFT LCD Module

4.2 LED connection and placement

| Doc.No. | LTN140AT07-K02 | Rev.No | 04-A01-G-091111 | Page | 13 / 30 |

5. INPUT TERMINAL PIN ASSIGNMENT

5.1. Input Signal & Power

Pin	Symbol	Function
1	NC	No Connection (Reserved for supplier)
2	VCC	Power Supply, 3.3V (typical)
3	VCC	Power Supply, 3.3V (typical)
4	VCC_EDID	DDC 3.3V power
5	NC	No Connection (Reserved for supplier)
6	CLK_EDID	DDC Clock
7	DATA_EDID	DDC Data
8	RXin0-	- LVDS differential data (R0-R5, G0)
9	RXin0+	+ LVDS differential data (R0-R5, G0)
10	GND	Ground
11	RXin1-	- LVDS differential data (G1-G5, B0-B1)
12	RXn1+	+ LVDS differential data (G1-G5, B0-B1)
13	GND	Ground
14	RXin2-	- LVDS differential data (B2-B5,HS,VS, DE)
15	RXn2+	+ LVDS differential data (B2-B5,HS,VS, DE)
16	GND	Ground
17	ClkIN-	- LVDS differential clock input
18	ClkIN+	+ LVDS differential clock input
19	GND	Ground
20~21	NC	No Connection
22	NC	Ground
23~24	NC	No Connection
25	NC	Ground
26~27	NC	No Connection
28	NC	Ground
29~30	NC	No Connection
31~33	VBL-	LED Ground
34	NC	No Connection
35	PWM	PWM for luminance control
36	LED_EN	BL On/Off (On: 2.0~3.3V, Off: 0~0.5V)
37	NC	No Connection
38~40	VBL(7~20)	*LED Power Supply 7V-20V

Samsung Secret

Doc.No.	LTN140AT07-K02	Rev.No	04-A01-G-091111	Page	14 / 30

Approval

5.3 LVDS Interface

Pin No.	Name	RGB Signal	Pin No.	Name	RGB Signal
51	TxIN0	R0	14	TxIN14	G5
52	TxIN1	R1	15	TxIN15	B0
54	TxIN2	R2	19	TxIN18	B1
55	TxIN3	R3	20	TxIN19	B2
56	TxIN4	R4	22	TxIN20	B3
3	TxIN6	R5	23	TxIN21	B4
4	TxIN7	G0	24	TxIN22	B5
6	TxIN8	G1	27	TxIN24	Hsync
7	TxIN9	G2	28	TxIN25	Vsync
11	TxIN12	G3	30	TxIN26	DE
12	TxIN13	G4	31	TxCLKIN	Clock

LVDS Interface
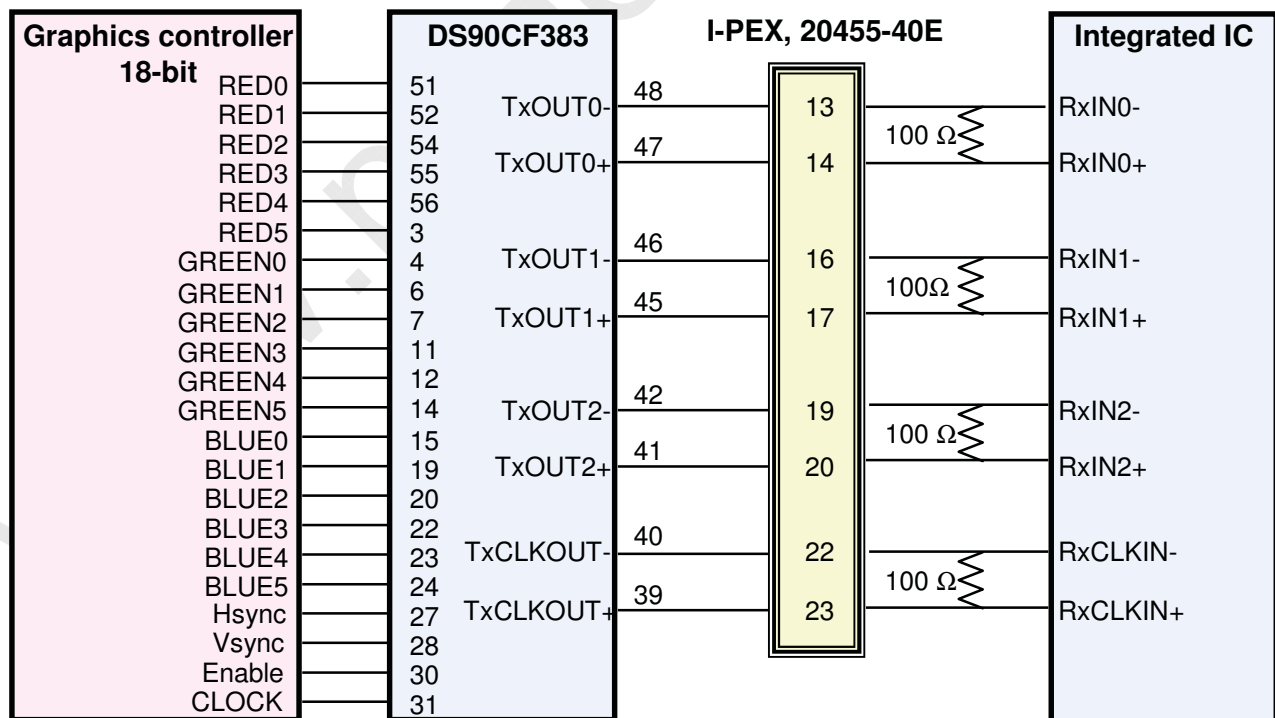
Note : The LCD Module uses a 100ohm resistor between positive and negative lines of each receiver input.
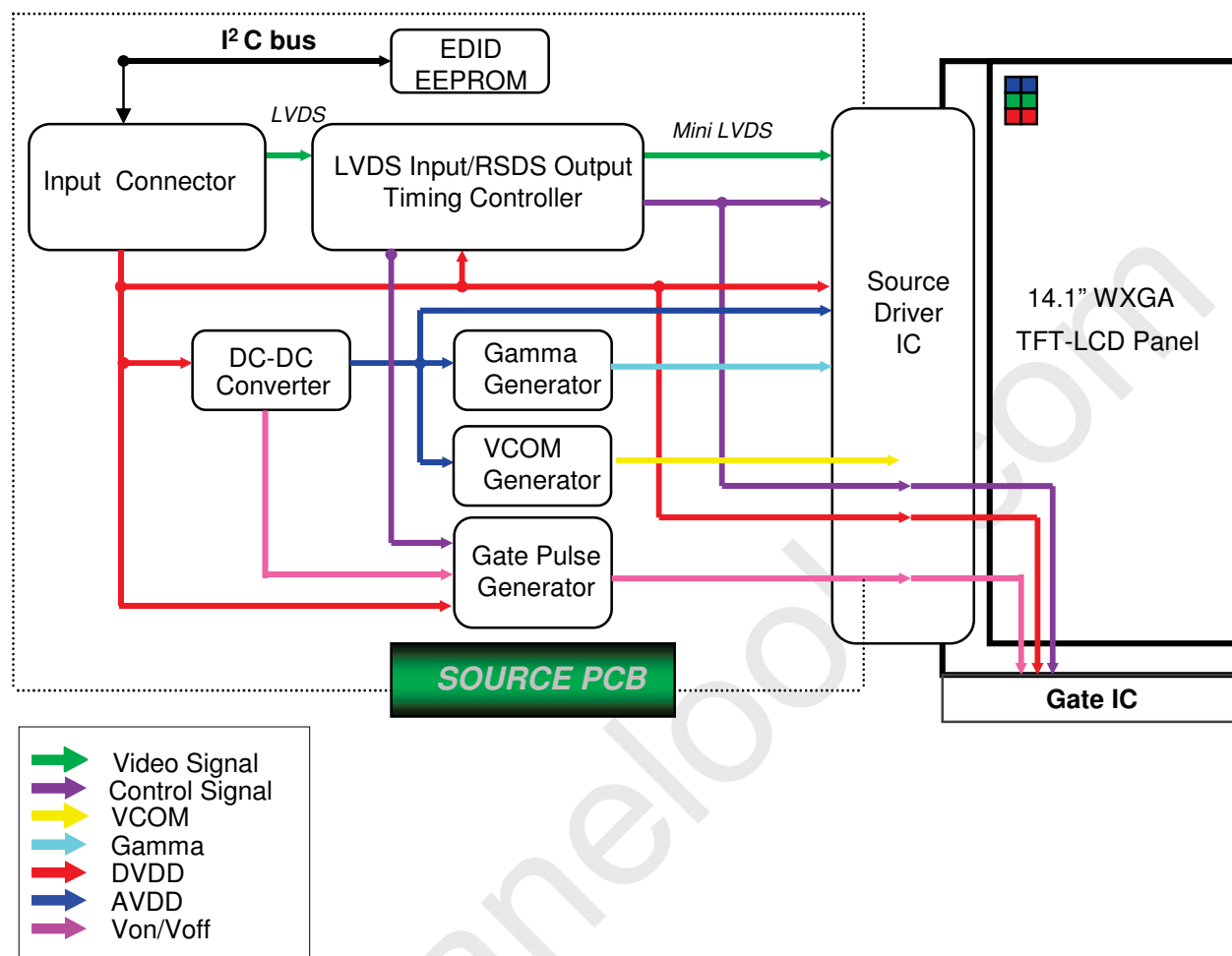
Samsung Secret

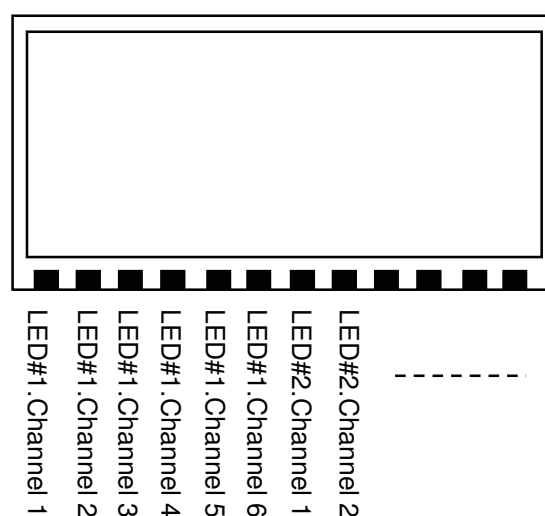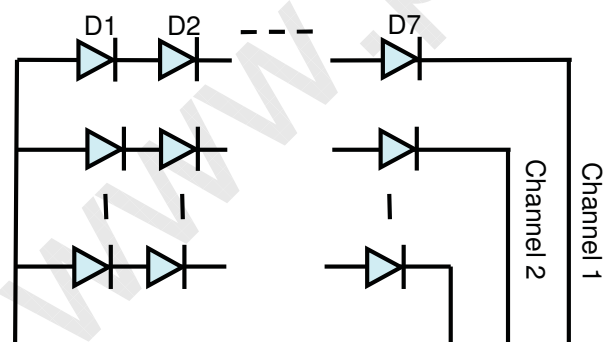| Doc.No.	LTN140AT07-K02	Rev.No	04-A01-G-091111	Page	15 / 30

Approval

5.4 Timing Diagrams of LVDS For Transmission

LVDS Receiver : Integrated T-CON
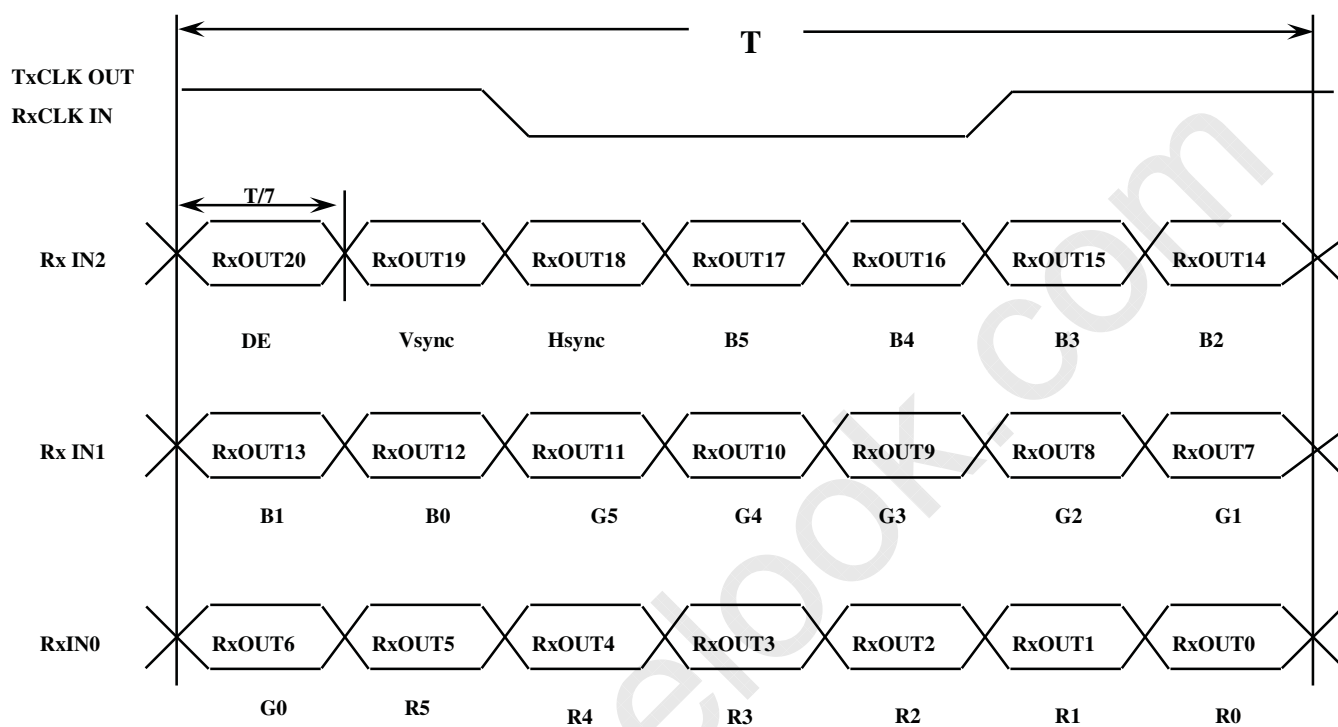
Doc.No.	LTN140AT07-K02	Rev.No	04-A01-G-091111	Page	16 / 30

Approval

5.5 Input Signals, Basic Display Colors and Gray Scale of Each Color

Color	Display	Data Signal																		Gray Scale Level
		Red						Green						Blue						
		R0	R1	R2	R3	R4	R5	G0	G1	G2	G3	G4	G5	B0	B1	B2	B3	45	B5	
Basic Colors	Black	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-
	Blue	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	-
	Green	0	0	0	0	0	0	1	1	1	1	1	1	0	0	0	0	0	0	-
	Cyan	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	-
	Red	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	-
	Magenta	1	1	1	1	1	1	0	0	0	0	0	0	1	1	1	1	1	1	-
	Yellow	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	-
	White	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	-
Gray Scale Of Red	Black	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	R0
	Dark	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	R1
	↑	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	R2
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	R3~R60
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	
	↓	1	0	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	R61
	Light	0	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	R62
	Red	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	R63
Gray Scale Of Green	Black	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	G0
	Dark	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	G1
	↑	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	G2
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	G3~G60
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	
	↓	0	0	0	0	0	0	1	0	1	1	1	1	0	0	0	0	0	0	G61
	Light	0	0	0	0	0	0	0	1	1	1	1	1	0	0	0	0	0	0	G62
	Green	0	0	0	0	0	0	1	1	1	1	1	1	0	0	0	0	0	0	G63
Gray Scale Of Blue	Black	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	B0
	Dark	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	B1
	↑	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B2
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	B3~B60
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	
	↓	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1	1	1	B61
	Light	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	B62
	Blue	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	B63

Note 1) Definition of gray :
Rn: Red gray, Gn: Green gray, Bn: Blue gray (n=gray level)
Note 2)Input signal: 0 =Low level voltage, 1=High level voltage

Doc.No.	LTN140AT07-K02	Rev.No	04-A01-G-091111	Page	17 / 30

Approval

5.6 Pixel Format in the display

LTN140AT07-L01 Panel
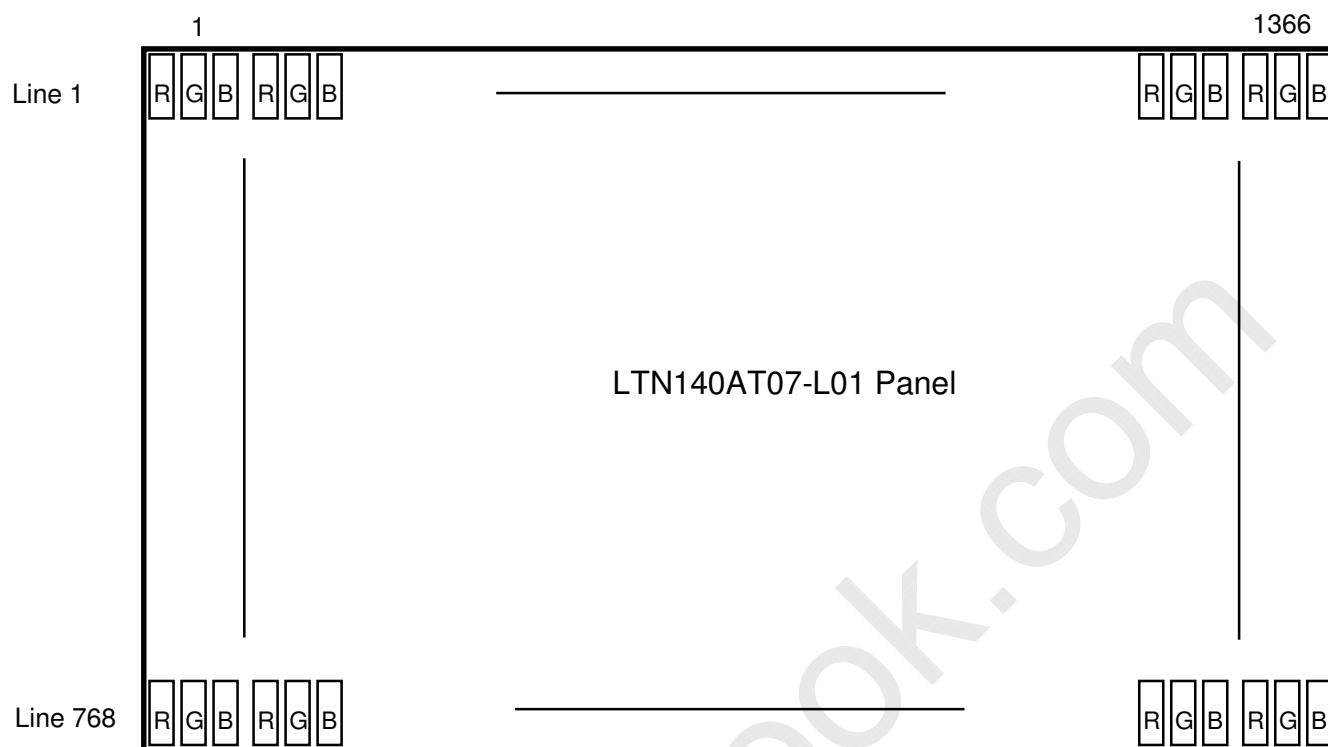
Doc.No.	LTN140AT07-K02	Rev.No	04-A01-G-091111	Page	18 / 30

Approval

6. INTERFACE TIMING

6.1 Timing Parameters

Signal	Item	Symbol	Min.	Typ.	Max.	Unit	Note
Frame Frequency	Cycle	T_V	780	790	980	Lines	
Vertical Active Display Term	Display Period	T_{VD}	-	768	-	Lines	
One Line Scanning Time	Cycle	T_H	1440	1526	1800	Clocks	
Horizontal Active Display Term	Display Period	T_{HD}	-	1366	-	Clocks	

6.2 Timing diagrams of interface signal
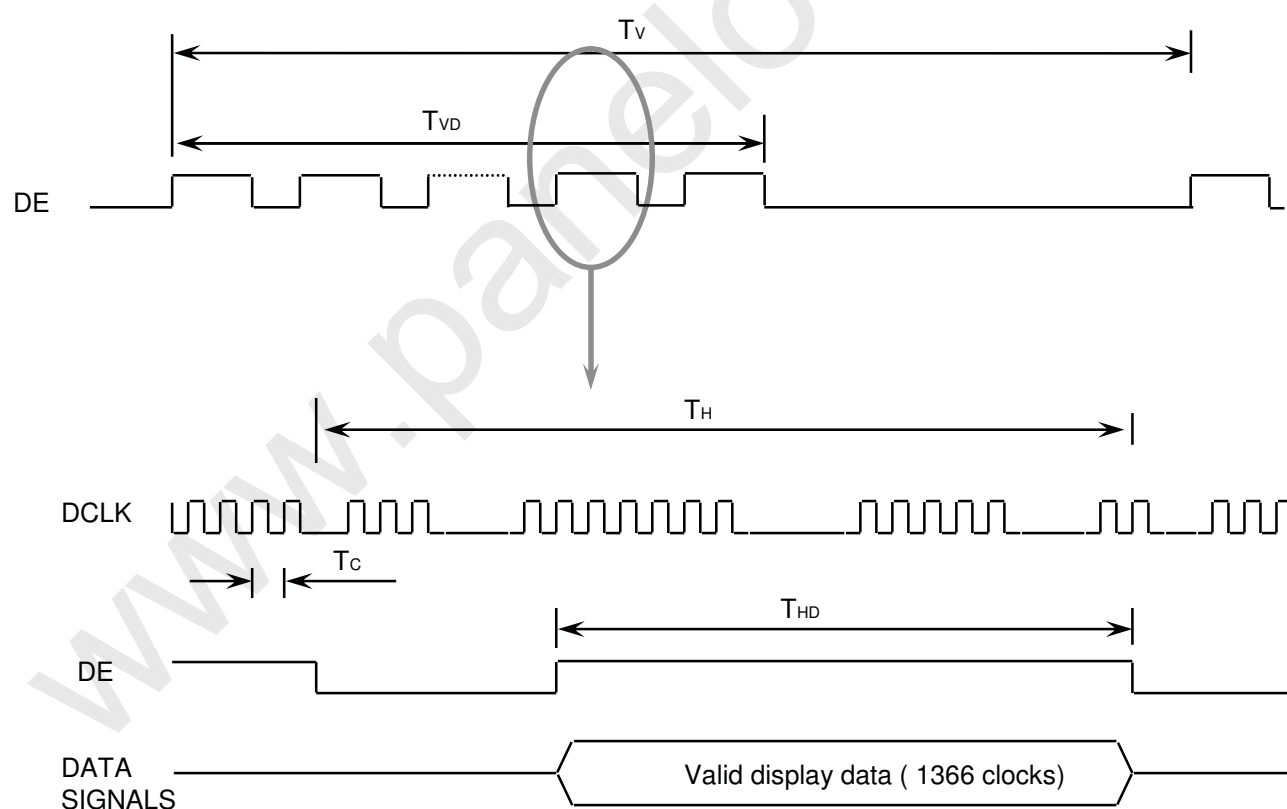
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Doc.No.	LTN140AT07-K02	Rev.No	04-A01-G-091111	Page	19 / 30

6.3 Power ON/OFF Sequence

Approval

: To prevent a latch-up or DC operation of the LCD module, the power on/off sequence should be as the diagram below.

Power Supply VDD

0.9 V_{DD}
0.1 V_{DD}
0V

$0.5 < T_1 \le 10$ msec
$0 < T_2 \le 50$ msec
$0 < T_3 \le 50$ msec
500 msec $\le T_4$

T_1　T_2　T_3　T_4

Signals

VALID

0 V

Power On　　　Power Off

Back-light
200 msec $\le T_5$
200 msec $\le T_6$

50%　50%

T_5　T_6
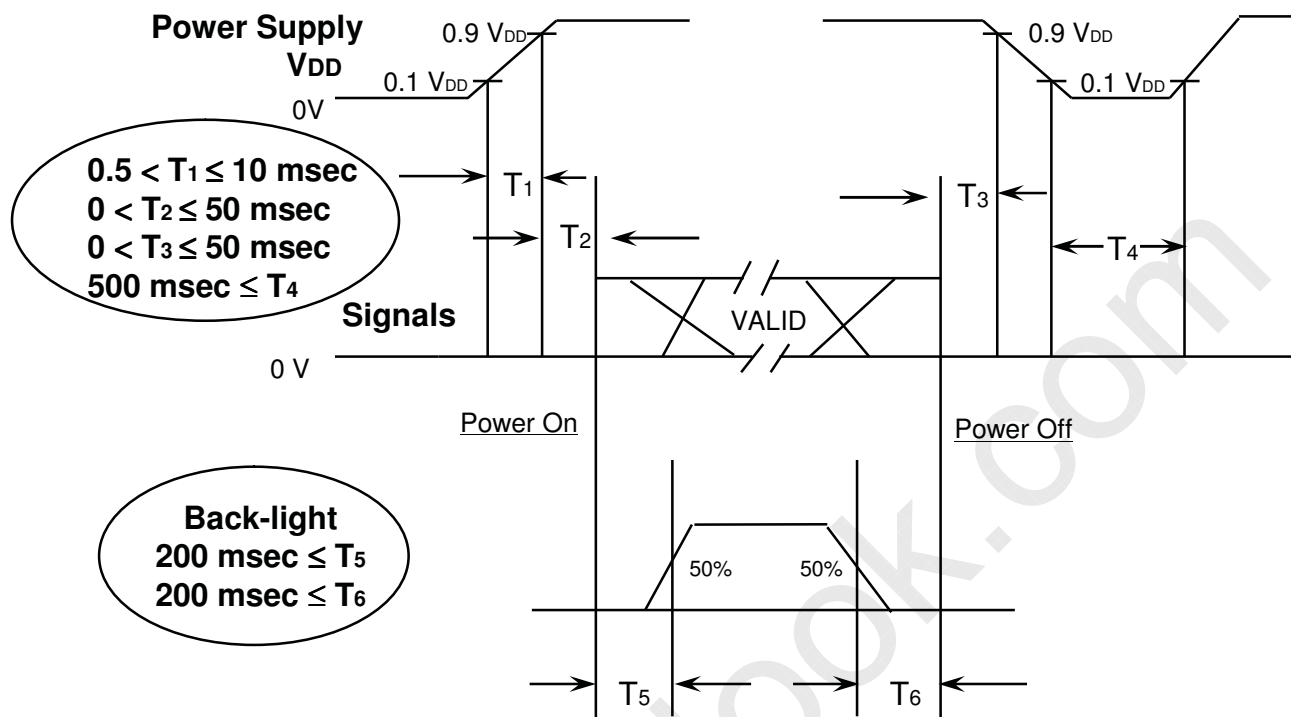
Power ON/OFF Sequence

T1 : Vdd rising time from 10% to 90%
T2 : The time from Vdd to valid data at power ON.
T3 : The time from valid data off to Vdd off at power Off.
T4 : Vdd off time for Windows restart
T5 : The time from valid data to B/L enable at power ON.
T6 : The time from valid data off to B/L disable at power Off.

NOTE.

(1) The supply voltage of the external system for the module input should be the same as the definition of V_{DD}.

(2) Apply the lamp voltage within the LCD operation range. When the back-light turns on before the LCD operation or the LCD turns off before the back-light turns off, the display may momentarily become white.

(3) In case of V_{DD} = off level, please keep the level of input signals on the low or keep a high impedance.

(4) T4 should be measured after the module has been fully discharged between power off and on period.

(5) Interface signal shall not be kept at high impedance when the power is on.

Doc.No.	LTN140AT07-K02	Rev.No	04-A01-G-091111	Page	20 / 30

7. Mechanical Outline Dimension

Approval

It will be attached with PDF file

Doc.No.	LTN140AT07-K02	**Rev.No**	04-A01-G-091111	**Page**	21 / 30

LTN140AT07-K02

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* NOTE

1. SIGNAL INTERFACE CONNECTOR TO BE SPECIFIED AS BELOW.
   - MAKER : I-PEX
   - PART NO : 20455-040E-02S

2. CALIPERS MEASURING FORCE : 750 ± 150 gf

3. USER HOLE TORQUE SPEC : 2.5kgf·cm Max (5TIMES)

4. WEIGHT SPEC : 350g MAX

5. In order to avoid IC damage,
   it is not allow that overlapping of cables or
   antennas, camera, WLAN,WWAN over these COF locations

6. (*) MAX THICKNESS 5,4, inclusive of the tape.

BM SHIFT SPEC.

BEZEL OPENING

ACTIVE AREA

|A-B| < 1.0 (mm)
|C-D| < 1.0 (mm)
|BM| ≥ 1.0 (mm)

I-PEX 20455-040E-02S

COF

TAPE(*)

ACTIVE CENTER

SIGNAL PIN #1

6-M2.0 x P0.4 TAPPING

LTN140AT07

<USER HOLE SCREW PENETRATION DEPTH>

2.5 MAX (SCREW PENETRATION)

5.20 MAX

323.50±0.3 [OUTLINE]
312.8±0.5 [BEZEL OPEN]
309.40±0.3 [ACTIVE AREA]
161.75±0.5

128.00 ±1.00

35.00 ±1.00

(7.05)
(9.02)

192.00±0.3 [OUTLINE]
177.36±0.5 [BEZEL OPEN]
173.95±0.3 [ACTIVE AREA]
82.00±0.5
(7.05)
(9.02)

162.00±0.30
81.00±0.30
3.10±0.30
14.00±0.30

35.00 ±1.00
128.00 ±1.00

(30.00)
(3.00)
(5.00)
(6.00)
(4.00)
(3-40.8)
(50.00)
(6.00)
(4.00)
(50.00)
(287.45)
(265.261)
(192.95)
(161.977)
(83.05)
(58.693)
(30.00)
(6.55)
(5.00)
(3.00)

TAPE(*)
COF
TAPE(*)

SAMSUNG ELECTRONICS

LTN140AT07-K02

OUTLINE DIMENSION

MODEL NAME LTN140AT07-K02

J.G.OH 09.11.13

UNIT : mm
SCALE : 1/1
TOLERANCE ±0.5
SHEET 1/1
VER .000

8. PACKING

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1. CARTON(Internal Package)

(1) Packing Form
Corrugated Cardboard box and EPS form as shock absorber

(2) Packing Method

CUSHION TOP

PANEL

PACKING CASE

CUSHION BOTTOM
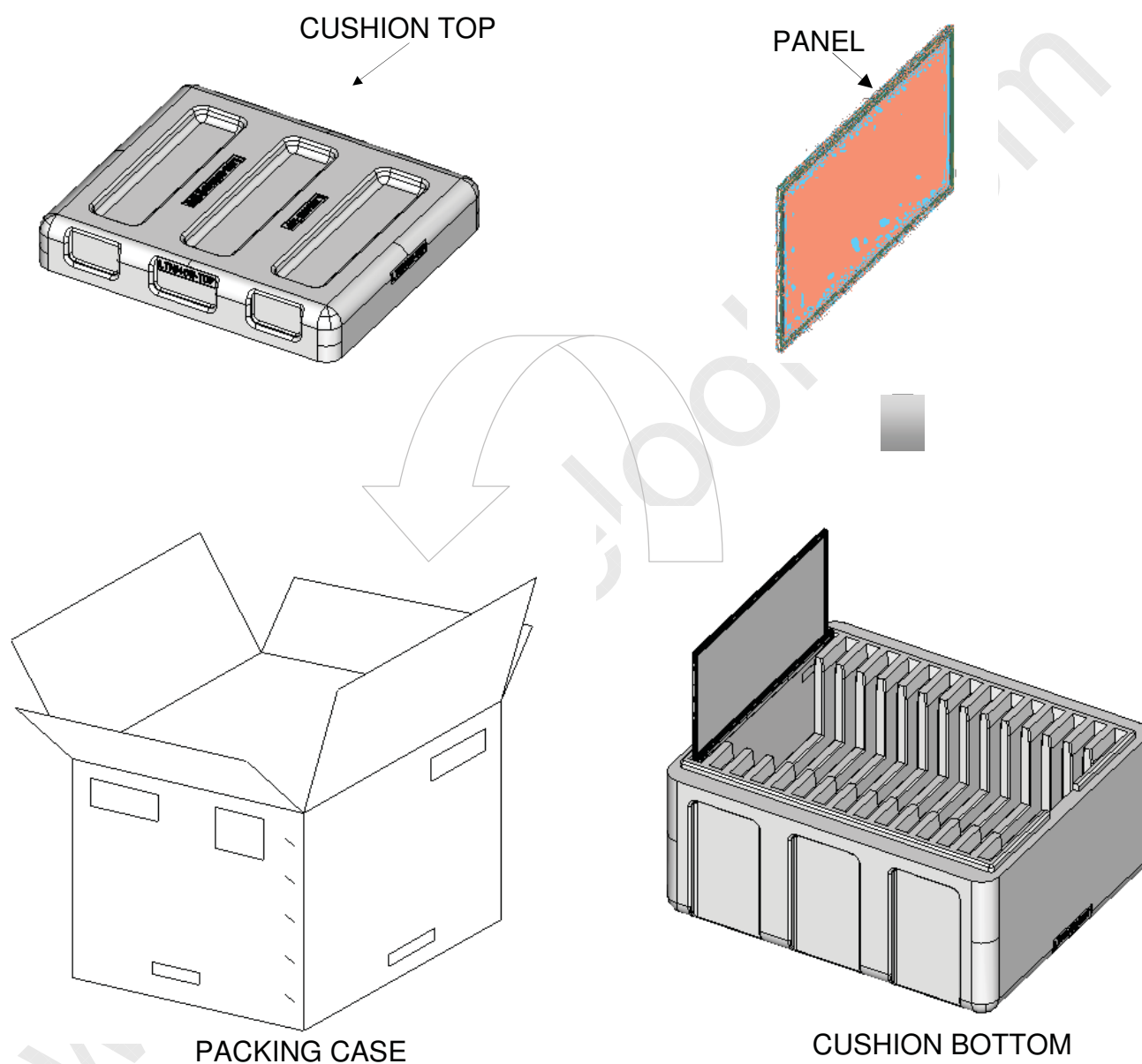
Note 1)Total Weight : Approximately (13.2) kg

2) Acceptance number of piling : 30 sets

3) Carton size : 495(W) x 423(D) x 310 (H)

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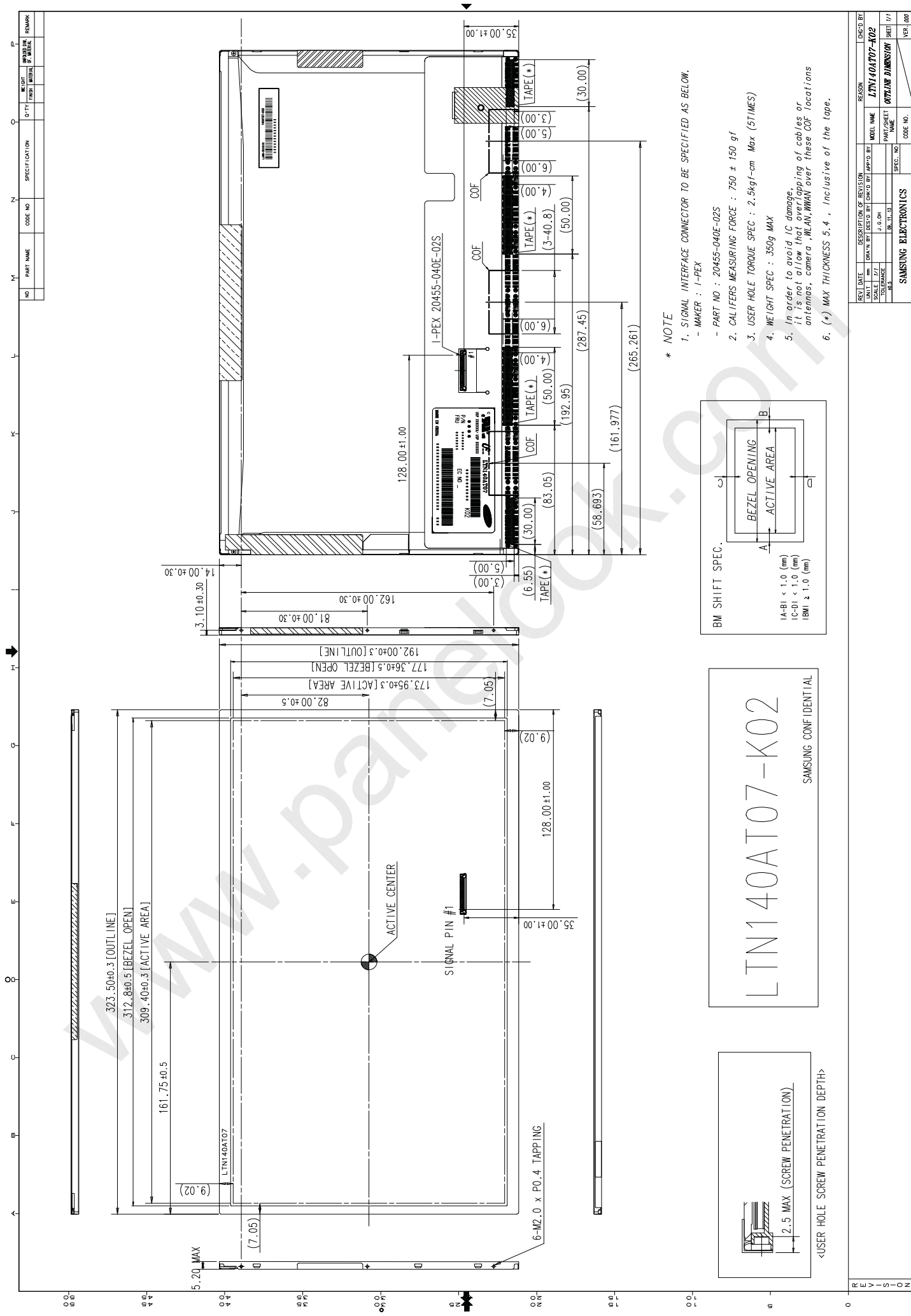| Doc.No.	LTN140AT07-K02	Rev.No	04-A01-G-091111	Page	23 / 30

(3)Packing Material

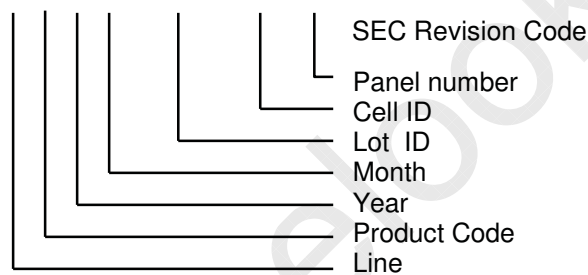| No	Part name	Quantity
1	Static electric protective sack	30 pcs
2	Packing case (Inner box) included shock absorber	1 set
3	Pictorial marking	2 pcs
4	Carton	1 set

9. MARKINGS & OTHERS

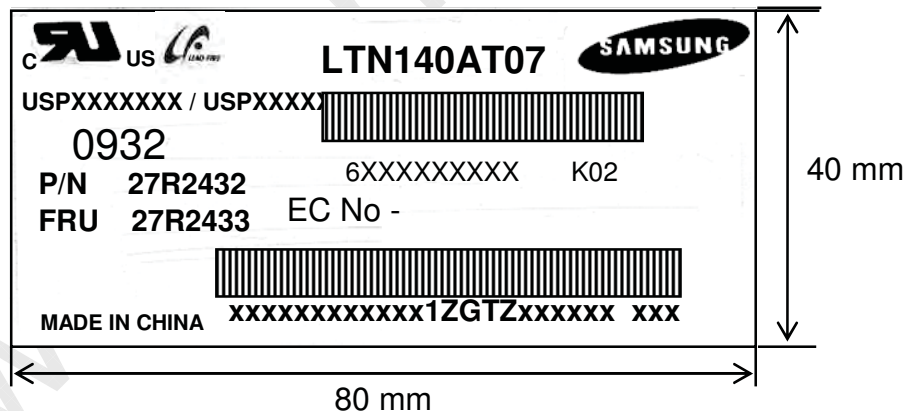A nameplate bearing followed by is affixed to a shipped product at the specified location on each product.

(1)Parts number : LTN140AT07
(2)Revision code : 3 letters
(3)Lot number   : X X X X   XXX   XX   X   K02

```
                                        SEC Revision Code
                                        Panel number
                                        Cell ID
                                        Lot  ID
                                        Month
                                        Year
                                        Product Code
                                        Line
```

(4) Product Label Definition


```
c [UL] US  [Lead Free]   LTN140AT07    SAMSUNG

USPXXXXXXX / USPXXXXX  |||||||||||||||

  0932
 P/N   27R2432         6XXXXXXXXX      K02         40 mm
 FRU   27R2433         EC No -

                       |||||||||||||||
 MADE IN CHINA  xxxxxxxxxxxxx1ZGTZxxxxxx  xxx
```

80 mm

Parts name   : LTN140AT07
Lot number   : XXXXXXXXXX
Inspected work week   : 0814(2008 year 14th weeks)
Product Revision Code : K02
P/N   : Lenovo Part Number (27R2432)
EC NO   : Engineering Change Number (Blank)
FRU   : Field Replaceable Unit Part Number(27R2433)
Header Code   : 1ZGTZ

Samsung Secret

Doc.No.	LTN140AT07-K02	Rev.No	04-A01-G-091111	Page	24 / 30

Approval

High voltage caution label

	HIGH VOLTAGE CAUTION	THIS COVER CONTAINS FLUORESCENT LAMP. PLEASE FOLLOW LOCAL ORDINANCES OR REGULATIONS FOR ITS DISPOSAL
⚡	RISK OF ELECTRIC SHOCK DISCONNECT THE ELECTRIC POWER BEFORE SERVICE	

10mm　High voltage caution

70mm

(5) Packing small box attach

SAMSUNG
ELECTRONICS

DEVICE　　　: LTN140AT07
TYPE　　　　: K02
QUANTITY　　: 30 PCS

CO6040001

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Doc.No.	LTN140AT07-K02	Rev.No	04-A01-G-091111	Page	25 / 30

10. GENERAL PRECAUTIONS

Approval

1. Handling

(a) When the module is assembled, It should be attached to the system firmly
using every mounting holes. Be careful not to twist and bend the modules.

(b) Refrain from strong mechanical shock and / or any force to the module. In addition to
damage, this may cause improper operation or damage to the module and CCFT back-light.

(c) Note that polarizers are very fragile and could be easily damaged. Do not press or scratch
the surface harder than a HB pencil lead.

(d) Wipe off water droplets or oil immediately. If you leave the droplets for a long time,
Staining and discoloration may occur.

(e) If the surface of the polarizer is dirty, clean it using some absorbent cotton or soft cloth.

(f) The desirable cleaners are water, IPA (Isoprophyl Alcohol) or Hexane.
Do not use Ketone type materials(ex. Acetone), Ethyl alcohol, Toluene, Ethyl acid or Methyl
chloride. It might permanent damage to the polarizer due to chemical reaction.

(g) If the liquid crystal material leaks from the panel, it should be kept away from the eyes or
mouth . In case of contact with hands, legs or clothes, it must be washed away thoroughly
with soap.

(h) Protect the module from static , it may cause damage to the C-MOS Gate Array IC.

(i) Use fingerstalls with soft gloves in order to keep display clean during the incoming
inspection and assembly process.

(j) Do not disassemble the module.

(k) Do not pull or fold the lamp wire.

(l) Do not adjust the variable resistor which is located on the back side.

(m) Protection film for polarizer on the module shall be slowly peeled off just before use so
that the electrostatic charge can be minimized.

(n) Pins of I/F connector shall not be touched directly with bare hands.

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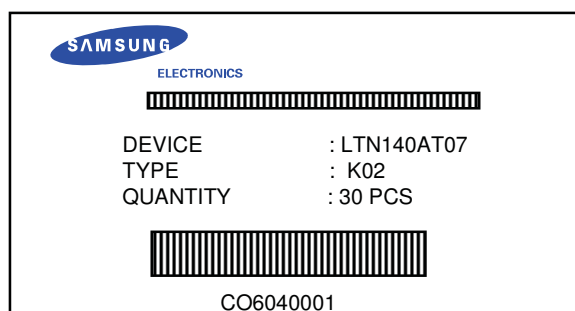| Doc.No.	LTN140AT07-K02	Rev.No	04-A01-G-091111	Page	26 / 30

2. STORAGE

Approval

(a) Do not leave the module in high temperature, and high humidity for a long time.
   It is highly recommended to store the module with temperature from 0 to 35 ℃ and
   relative humidity of less than 70%.

(b) Do not store the TFT-LCD module in direct sunlight.

(c) The module shall be stored in a dark place. It is prohibited to apply sunlight or fluorescent
   light during the store.

3. OPERATION

(a) Do not connect,disconnect the module in the " Power On" condition.

(b) Power supply should always be turned on/off by following item 6.3
   " Power on/off sequence ".

(c) Module has high frequency circuits. Sufficient suppression to the electromagnetic
   interference shall be done by system manufacturers. Grounding and shielding methods
   may be important to minimize the interference.

(d) The cable between the back-light connector and its inverter power supply shall be a
   minimized length and be connected directly . The longer cable between the back-light
   and the inverter may cause lower luminance of lamp(CCFT) and may require higher
   startup voltage (Vs).

(e) The standard limited warranty is only applicable when the module is used for general
   notebook applications. If used for purposes other than as specified, SEC is not to be
   held reliable for the defective operations. It is strongly recommended to contact SEC
   to find out fitness for a particular purpose.

4. OTHERS

(a) Ultra-violet ray filter is necessary for outdoor operation.

(b) Avoid condensation of water. It may result in improper operation or disconnection
   of electrode.

(c) Do not exceed the absolute maximum rating value. (the supply voltage variation, input
   voltage variation, variation in part contents and environmental temperature, so on)
   Otherwise the module may be damaged.

(d) If the module displays the same pattern continuously for a long period of time,it can be
   the situation when the image "sticks" to the screen.

(e) This module has its circuitry PCB's on the rear side and should be handled carefully in
   order not to be stressed.

Samsung Secret

Doc.No.	LTN140AT07-K02	Rev.No	04-A01-G-091111	Page	27 / 30

11. EDID

Approval

Address (HEX)	FUNCTION	Value HEX	BIN	DEC	ASCII or Data	Notes
00	Header	00	00000000	0		EDID Header
01		FF	11111111	255		
02		FF	11111111	255		
03		FF	11111111	255		
04		FF	11111111	255		
05		FF	11111111	255		
06		FF	11111111	255		
07		00	00000000	0		
08	ID Manufacturer Name	30	00110000	48	L	3 character ID
					E	
09		AE	10101110	174	N	"LEN" as an end-customer
0A	ID Product Code	A0	10100000	160		#HD LED
0B		40	01000000	64		
0C	32-bit serial no.	00	00000000	0		
0D		00	00000000	0		
0E		00	00000000	0		
0F		00	00000000	0		
10	Week of manufacture	00	00000000	0		
11	Year of manufacture	13	00010011	19	2009	2009
12	EDID Structure Ver.	01	00000001	1	1	EDID Ver. 1.0
13	EDID revision #	03	00000011	3	3	EDID Rev. 3
14	Video input definition	80	10000000	128		
15	Max H image size	1F	00011111	31	31	31 cm(approx)
16	Max V image size	11	00010001	17	17	17 cm(approx)
17	Display Gamma	78	01111000	120	2.2	Gamma 2.2
18	Feature support	EA	11101010	234		
19	Red/green low bits	87	10000111	135		10000111
1A	Blue/white low bits	F5	11110101	245		11111110
1B	Red x/ high bits	94	10010100	148	0.580	Red x 0.580= 10010100
1C	Red y	57	01010111	87	0.340	Red y 0.340= 01010111
1D	Green x	4F	01001111	79	0.310	Green x 0.310= 01001111
1E	Green y	8C	10001100	140	0.550	Green y 0.550= 10001100
1F	Blue x	27	00100111	39	0.155	Blue x 0155= 00100111
20	Blue y	27	00100111	39	0.155	Blue y 0155= 00100111
21	White x	50	01010000	80	0.313	White x 0.313= 01010000
22	White y	54	01010100	84	0.329	White y 0.329= 01010100
23	Established timing 1	00	00000000	0		
24	Established timing 2	00	00000000	0		
25	Established timing 3	00	00000000	0		

Samsung Secret

Doc.No.	LTN140AT07-K02	Rev.No	04-A01-G-091111	Page	28 / 30

11. EDID

Approval

26	Standard timing #1	01	00000001	1		not used
27		01	00000001	1		
28	Standard timing #2	01	00000001	1		not used
29		01	00000001	1		
2A	Standard timing #3	01	00000001	1		not used
2B		01	00000001	1		
2C	Standard timing #4	01	00000001	1		not used
2D		01	00000001	1		
2E	70	01	00000001	1		not used
2F		01	00000001	1		
30	Standard timing #6	01	00000001	1		not used
31		01	00000001	1		
32	Standard timing #7	01	00000001	1		not used
33		01	00000001	1		
34	Standard timing #8	01	00000001	1		not used
35		01	00000001	1		
36	Detailed timing/monitor descriptor #1	41	01000001	65	72.33	Main clock= 72.33 MHz (@60Hz)
37		1C	00011100	28		
38		56	01010110	86	1366	Hor active=683*2 pixels
39		A0	10100000	160	160	Hor blanking=160pixels
3A		50	01010000	80		4bit : 4bit
3B		00	00000000	0	768	Vertcal active=768 lines
3C		16	00010110	22	22	Vertical blanking=22 lines
3D		30	00110000	48		4bit : 4bit
3E		30	00110000	48	48	Hor sync. Offset=48 pixels
3F		20	00100000	32	32	H sync. Width=32 pixels
40		25	00100101	37	2	V sync. Offset=2 lines
					5	V sync. Width=5 lines
41		00	00000000	0		2bit : 2bit :2bit :2bit
42		35	00110101	53	309	H image size= 309 mm(approx)
43		AE	10101110	174	174	V image size = 174 mm(approx)
44		10	00010000	16		
45		00	00000000	0		No Horizontal Border
46		00	00000000	0		No Vertical Border
47		19	00011001	25		
48	Detailed timing/monitor descriptor #2	CA	11001010	202	58.34	Main clock= 58.34 MHz (@50Hz)
49		16	00010110	22		
4A		56	01010110	86	1366	Hor active=683*2 pixels
4B		6F	01101111	111	111	Hor blanking=111pixels
4C		50	01010000	80		4bit : 4bit
4D		00	00000000	0	768	Vertcal active=768 lines
4E		16	00010110	22	22	Vertical blanking=22 lines
4F		30	00110000	48		4bit : 4bit
50		30	00110000	48	48	Hor sync. Offset=48 pixels
51		20	00100000	32	32	H sync. Width=32 pixels
52		25	00100101	37	2	V sync. Offset=2 lines
					5	V sync. Width=5 lines
53		00	00000000	0		2bit : 2bit :2bit :2bit
54		35	00110101	53	309	H image size= 309 mm(approx)
55		AE	10101110	174	174	V image size = 174 mm(approx)
56		10	00010000	16		
57		00	00000000	0		No Horizontal Border
58		00	00000000	0		No Vertical Border
59		19	00011001	25		

Samsung Secret

Doc.No.	LTN140AT07-K02	Rev.No	04-A01-G-091111	Page	29 / 30

11. EDID

Approval

5A	descriptor #3	00	00000000	0		
5B		00	00000000	0		
5C		00	00000000	0		Manufacturer Specified (Timing)
5D		0F	00001111	15		
5E		00	00000000	0		
5F		8C	10001100	140		(Horizontal active pixel /8)-31
60		09	00001010	9		Image Aspect Ratio(16:9)
61		32	00110010	50		Low Refresh Rate #1(50Hz)
62		8C	10001100	140		(Horizontal active pixel /8)-31
63		09	00001010	9		Image Aspect Ratio(16:9)
64		28	00101000	40		Low Refresh Rate #1(40Hz)
65		16	00010110	22		Brightness(1/10nit)
66		09	00001001	9		Feature flag(TN/LEDmode)
67		00	00000000	0		
68		4C	01001100	76		supplier ID "SEC"
69		A3	10100011	163		
6A		41	01000001	65	[A]	**Product code "AT"**
6B		54	01010100	84	[T]	**(Hex, LSB first)**
6C		00	00000000	0		
6D		00	00000000	0		
6E		00	00000000	0		Monitor Name Tag (ASCII)
6F		FE	11111110	254		
70		00	00000000	0		
71		4C	01001100	76	[L]	
72		54	01010100	84	[T]	
73	Detailed timing/monitor	4E	01001110	78	[N]	
74	descriptor #4	31	00110001	49	[1]	
75		34	00110100	52	[4]	
76		30	00110000	48	[0]	
77		41	01000001	65	[A]	
78		54	01010100	84	[T]	
79		30	00110000	48	[0]	
7A		37	00110111	55	[7]	
7B		4B	01001011	75	[K]	
7C		30	00110000	48	[0]	
7D		32	00110010	50	[2]	
7E	Extension Flag	00	00000000	0		
7F	Checksum	55	01010101	85		

Doc.No.	LTN140AT07-K02	Rev.No	04-A01-G-091111	Page	30 / 30